

titration to a final pH of 9 and is a measure of the silanol group density of a silicic acid. This determination is known to those of skill in the art and is indicated in the present specification to be carried out according to G.W. Sears, Analyt. Chemistry 12:1982-83 (1956) (See page 2, line 20-22 of the present specification). Withdrawal of the rejection is respectfully requested.

The Examiner also indicated that in claim 1, line 12, V_1 and V_2 are not defined. The definitions for the consumption of mercury in the mercury porosimetry (V_1 and V_2) are found in Figure 5. It is indicated there that V_2 is the consumption of mercury in milliliters for the pores of 175 to 275 Å and V_1 is the consumption in milliliters of mercury for the pores < 400 Å.

Withdrawal of the rejection is respectfully requested.

Claims 1 and 7 have been rejected under 35 U.S.C. § 103 as obvious over Lagarde et al., and under 35 U.S.C. § 102/103 as being anticipated by or obvious over Johnson et al. These rejections are traversed for the following reasons.

As Applicants have previously noted, the claimed products are distinct from those of Lagarde et al. because the precipitated silicas differ with respect to some of the characteristics which can be compared and also as to the uses for which they are employed.

The presently pending claims are drawn to a distinct precipitated silica which is characterized by a $V_2:V_1$ ratio

(determined with the mercury molding method) and by a DBP:CTAB ratio. These two parameters along with the other listed parameters identify a precipitated silica suitable for use in the manufacture of tires. See page 7 at lines 23-26 where the silica of the invention is used in natural rubber mixtures for tire manufacture. The tires made from rubber mixture containing the precipitated silica of the invention exhibit considerably improved properties, e.g. a higher modulus, a lower roll resistance and a better wear resistance. These advantages and others are found on page 10, lines 16-23 of this application. In contrast, Lagarde et al. is concerned with the development of a precipitated silica as a filler material for reinforcement of organosilicic polymers. Lagarde et al. employs a different silica material to start with (see column 4, last paragraph and column 5, first two paragraphs). The silica employed in the invention results from the addition of the acid to the water glass solution in one step (see example 1). Cf. Lagarde et al. where the acid is added to the water glass solution in several distinct steps. This difference in starting material should be considered when comparing the products.

Further, the silica product of Lagarde et al. has a specified composition (see tables in column 2) and is prepared in a specified fashion which permits blocking of any micropores (see column 5, lines 1-12). The resulting product is not used to manufacture tires but rather is added to

silicone rubber to form mixtures which are vulcanized. The end product specifically mentioned by Lagarde et al. is crepe rubber-soled shoes. See column 14, line 27. This silicone rubber product on its face does not appear to meet the requirements of automobile tires in regards to wear resistance, mechanical strength and tear resistance.

Also, Lagarde et al. describes a precipitated silica which is characterized in column 2, lines 1-34 in terms of physicochemical data. Among the other listed properties, the silica of Lagarde et al. is characterized as having a sodium content which must be less than 500 ppm. The low sodium content of the precipitated silica is necessary for their product. See Example 2. It can be gathered from column 2, lines 6-14 in Lagarde et al. that the precipitated silica with the low sodium content of <500 has the same reinforcing action as a pyrogenically produced silica.

Please note that the specific volume V_0 of Lagarde et al. has nothing in common with the claimed V_2/V_1 ratio range (note explanation above). Lagarde et al. measures only the volume which a silica occupies after a pressure load of 4 kg/cm². In contrast, the Hg porosimetry used in accordance with the invention measures macropores, placing the Hg consumption for a certain pore size (17.5 - 27.5 nm) in a ratio with a total Hg consumption for pores less than 40 nm. Accordingly, this ratio should be given weight in distinguishing the products.

As additional evidence, enclosed is a Declaration under Rule 132 of Dr. Udo Görl dated September 4, 1998 detailing the methods and results of tests carried out comparing the compositions of the present invention with those taught in the Lagarde et al. patent. The Examiner's attention is particularly directed to Table 3 of the Declaration, wherein vulcanizate data from silicas according to the present invention is compared with vulcanizate data from silicas according to the Lagarde et al. patent. The conclusions drawn from the data are set forth in paragraphs 6 and 7 of the Declaration, and indicate that the compositions of the present invention are different from, and exhibit marked advantages over, the compositions of Lagarde et al.

For all of the above reasons, withdrawal of the rejection over Lagarde et al. is respectfully requested.

The method of production of the silica according to Johnson is quite different from the method of the present invention. In claim 1 of Johnson, it is indicated that two different pH values can be held during the precipitation in step a)-- a metal oxide concentration of from about 2.1 to 2.6 grams per liter ($\text{pH} = 12.8 - 12.9$) or metal oxide concentration of from about 5.6 to 7.2 grams per liter (see step b). In contrast, according to the present invention, the pH is kept constant in the range of 7.5 - 10.5.

The method of Johnson consists of several steps:

- 1) precipitation

- 2) acidification
- 3) aging the reaction mixture
- 4) acidification

In contrast, the method of the present invention has only one step--precipitation with acidification.

The solid content of the reaction mixture at the end of the precipitation is 74 g/l SiO₂ according to example 1 of Johnson. According to claim 2, the solid content is 90 to 120 g/l SiO₂.

These differences show that the precipitated silicas produced by these methods are different. Johnson uses the precipitated silica as filler for battery separators (see col. 6, last line). The function of the silica is to introduce porosity into the polymeric material utilized to fabricate the battery separator (see col. 1, lines 55-60).

According to the present invention, the silica is used as a filler in rubber compositions to produce tires which have a low rolling resistance. This is possible because the silica of the present invention can be well dispersed in the rubber mixture.

Further evidence as to the differences between the compositions taught by Johnson and those of the present invention is set forth in the enclosed Declaration of Dr. Udo Görl dated October 15, 1998. The Declaration sets forth the results of tests conducted to compare the properties of the presently claimed compositions with those of Johnson. The

compositions were tested in a high silicic acid-filled PKU tread mixture based on L-SBR/BR (a tread compound introduced by Michelin in 1992). (It is noted for the Examiner's information that in Table 2 of the Declaration ("Rubber Technology") "Strength" means "Tear Strength", "Break Stretch" means "Elongation at Break" and "Break Energy" means "Energy at Break".)

As noted in paragraph 5 of the Declaration, substantial advantages are seen with the composition of the invention compared with that prepared as taught by Johnson. This clearly demonstrates the differences and unexpected advantages of the presently claimed compositions compared with those of Johnson.

For all of the above reasons, reconsideration and withdrawal of the rejection over Johnson are respectfully requested.

All rejections having been addressed, it is submitted that the application is in condition for allowance, and Notice to that effect is respectfully requested.

Respectfully submitted,

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